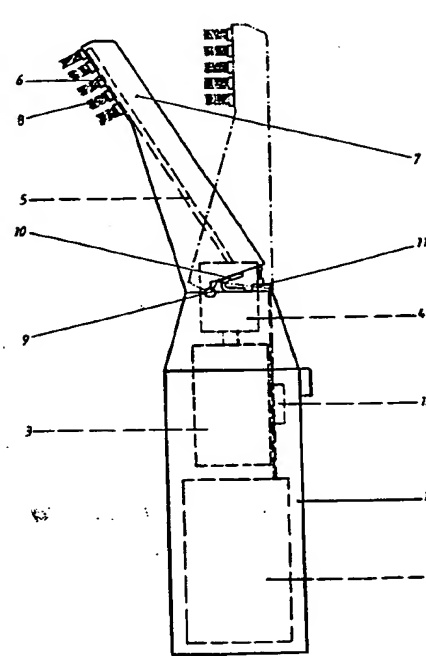


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(54) Title: TOOTHBRUSH DRIVEN BY AN ELECTRIC MOTOR BY WAY OF A GEAR (57) Abstract <p>In a toothbrush, which is driven by an electric motor (3) by way of a gear (4), a brush body (7) can be pivoted around a joint (9) relative to a handle (1). Following a specified pivoting distance, directed against the force of a spring (10), a sensor mechanism is actuated that changes by way of electronics the electric output or speed of an electric motor (3).</p> 		

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Specification

**TOOTHBRUSH DRIVEN BY AN ELECTRIC MOTOR
BY WAY OF A GEAR**

The invention relates to a toothbrush, which is driven by an electric motor by way of a gear, with a handle, carrying a brush body, and a pressure sensing mechanism, acting on the brush body while cleaning the teeth, and electronics, connected to the sensor mechanism. An electric toothbrush of this type is the subject matter of DE-U-90 17 453.4.

When cleaning the teeth, it is important that the toothbrush with the bristle tufts of its brush body is held with the correct pressure against the teeth. If the contact force is too low, the teeth are not adequately cleaned. If it is too high, the gum can be injured.

To ensure constant correct pressure on the teeth and the gum, the electric toothbrush according to the aforementioned DE-U-90 17 453.4 provides the toothbrush with an acoustic signal device, which is activated by the sensor mechanism by way of the electronics, when a specific pressure acts on the brush body and the brush body has pivoted around a cross joint against the force of a spring. Upon reaching a specified contact force, the electric motor of the toothbrush is supposed to be shut down, so that the teeth and gum cannot be negatively affected.

In practice it takes effort to generate continuously the exactly correct contact force while cleaning the teeth. Therefore, this invention is based on the problem of designing a toothbrush of the aforementioned kind driven by

an electric motor by way of a gear in such a manner that good cleaning of the teeth and massage of the gum is also guaranteed with varying contact forces.

This problem is solved according to the invention by designing the electronics and the sensor mechanism for controlling the gear and/or the speed and/or the torque of the electric motor.

In such an electric toothbrush the torque of the electric motor can be raised, for example, to the degree the brush body is pushed harder against the teeth. In this manner the speed does not decrease, even when the contact force increases. It would also be conceivable to change the speed as a function of the contact force. By means of the control of the electric motor or the gear, according to the invention, the toothbrush is adapted to the respectively acting contact force. For this reason, the user no longer has to generate, as according to the DE-U-90 17 453.4, with relatively great skill a very defined contact force, which is optimal precisely for the toothbrush he is using.

An advantageous embodiment of the invention consists of the electronics being designed to raise the motor output with increasing pressure up to a specified motor output and upon exceeding this pressure to reduce the motor output down to its standstill.

The electronics and also the control can be designed very differently. They are designed in an especially simple manner when the sensor mechanism has at least one switch, which can be operated against the force of a spring on the basis of the displacement of the brush body, in order to switch over the gear or the electric motor.

A continuous changing of the motor output or motor speed is readily possible, if the sensor device has an electric resistance that can be changed as a function of the displacement of the brush body.

Another advantageous embodiment of the invention consists of the electronics being designed to switch on or off a type of movement of the brush body as a function of the pressure on the brush body.

The invention allows various embodiments. To further clarify its basic principle, one of the embodiments is depicted diagrammatically in the drawing and is described in the following.

The illustrated toothbrush has a handle 1, in which a battery 2, an electric motor 3 and a gear 4 are disposed. The gear 4 sets, for example, a connecting rod 5 into reciprocal motion, so that the connecting rod can set, by way of non-illustrated gearwheels bristle carrier 6 with bristle tufts 8 of a brush body 7 into rotation.

The gear 4, operating the connecting rod 5, in the brush body 7 can be designed in accordance with that according to EP-B-0 254 397. However, a totally different is also possible. Relevant to the invention is only that the electric motor 3 transfers a movement to the brush body 7 and/or the bristle carrier 6. The brush body 7 could also affect a vibratory movement.

In the illustrated embodiment the brush body 7 can be pivoted to the right, as seen in the drawing, around a joint 9 relative to the handle 1. A spring 10, which is designed as a leg spring in this embodiment, prestresses the brush body 7 in the illustrated position. If the brush body 7 pivots to the right, it actuates a sensor

mechanism 11, which is connected to the electronics 12 in order to control the electric motor 3.

The sensor mechanism 11 can be designed in very different ways. In the simplest case it is a micro-switch, which closes a contact following a fixed tilting movement of the brush body 7 and thus a fixed force, resulting, for example, in a doubling of the torque of the electric motor 3.

If the illustrated electric toothbrush is used and the bristle tufts 8 are pressed with increasing force against the teeth, then the brush body 7 pivots increasingly, as seen in the drawing, to the right, thus compressing the spring 10. Following a specified pivoting distance, the sensor mechanism gives a signal, resulting, for example, in a change in the motor output or its speed.

In conclusion let it be said that the electronics 12 can also affect the gear 4, instead of the electric motor 3.

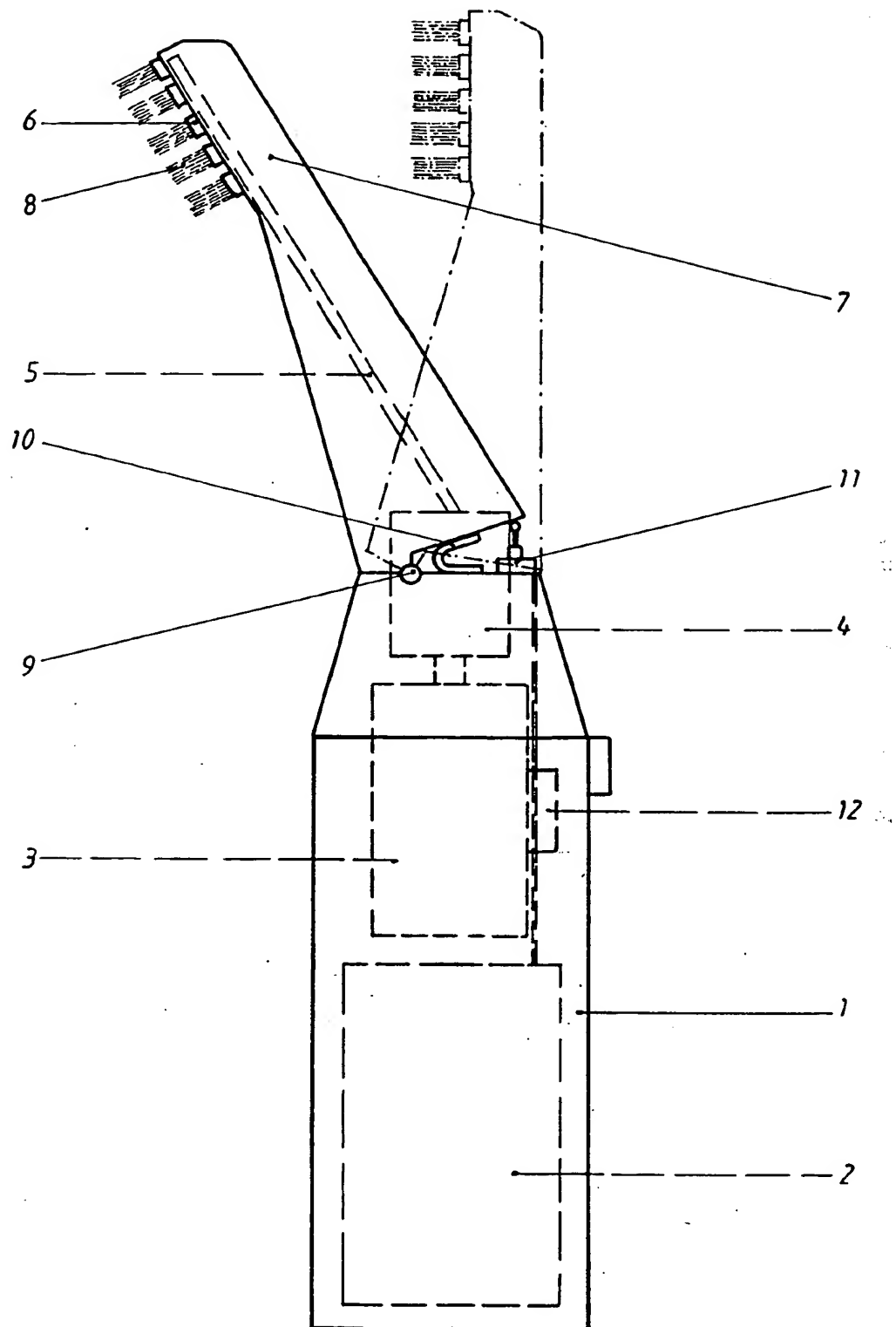
It is possible, for example, in a toothbrush, in which the brush body 7 affects a movement reciprocating in the direction of the longitudinal axis and a movement pivoting around its longitudinal axis, to switch one of these movements off as a function of the contact pressure of the bristle tufts 8 against the teeth.

LIST OF REFERENCE NUMERALS

- | | |
|----|------------------|
| 1 | handle |
| 2 | battery |
| 3 | electric motor |
| 4 | gear |
| 5 | connecting rod |
| 6 | bristle carrier |
| 7 | brush body |
| 8 | bristle tufts |
| 9 | joint |
| 10 | spring |
| 11 | sensor mechanism |
| 12 | electronics |

PATENT CLAIMS

1. Toothbrush, which is driven by an electric motor by way of a gear, with a handle, carrying a brush body, and a sensor mechanism for the pressure, acting on the brush body while cleaning the teeth, and electronics, connected to the sensor mechanism, wherein the electronics (12) and the sensor mechanism (11) are designed to control the gear (4) and/or the speed and/or the torque of the electric motor (3).
2. Toothbrush, as claimed in claim 1, wherein the electronics (12) are designed to raise the motor output with increasing pressure up to a specified motor output and upon exceeding this pressure to reduce the motor output down to the standstill of the electric motor (3).
3. Toothbrush, as claimed in claim 1 or 2, wherein the sensor mechanism (11) has at least one switch, which can be operated against the force of a spring on the basis of the displacement of the brush body (7), in order to switch over the gear and/or the electric motor (3).
4. Toothbrush, as claimed in any one of the preceding claims, wherein the sensor mechanism (11) has an electric resistance that can be changed as a function of the displacement of the brush body (7).
5. Toothbrush, as claimed in any one of the preceding claims, wherein the electronics (12) are designed to switch on or off a type of movement of the brush body (7) as a function of the pressure on the brush body (7).



SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP 93/02334

A. CLASSIFICATION OF SUBJECT MATTER

IPC 5 A61C17/22 A61C17/26 A61C17/34

According to International Patent Classification (IPC) or to both national classification and IPC:

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Minimum documentation searched (classification system followed by classification symbols)

IPC 5 A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,3 829 922 (KOBLANSKI) 20 August 1974 see the whole document ---	1,3
A	DE,U,90 17 453 (SIEGFRIED PETZ) 27 May 1992 cited in the application see the whole document -----	1

☐ Further documents are listed in the continuation of box C.

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Information on patent family members

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US-A-3829922	20-08-74	NONE	
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